AlGaAs Flip-Chip PIN Diode

MA4AGP907
V1

Features

- Low Series Resistance, 3 Ω
- Ultra Low Capacitance, 25 fF
- High Switching Cutoff Frequency, 40 GHz
- 2 Nanosecond Switching Speed
- Can be Driven by Buffered TTL
- Silicon Nitride Passivation
- Polyamide Scratch Protection

Description and Applications

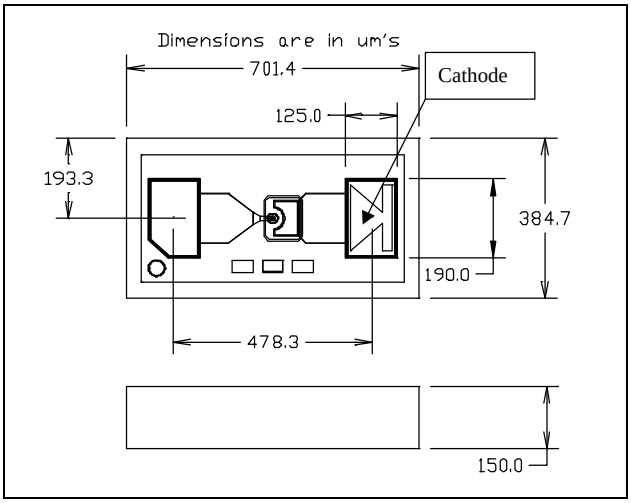
M/A-COM's MA4AGP907 is an Aluminum Gallium Arsenide Flip-Chip PIN diode. These devices are fabricated on OMCVD epitaxial wafers using a process designed for high device uniformity and extremely low parasitics. The diodes exhibit an extremely low RC Product, (0.1 ps) and 2 nS switching characteristics. The useable frequency range is 100 MHz to 40 GHz.

They are fully passivated with silicon nitride and have an additional layer of a polymer for scratch protection. The protective coatings prevent damage to the junction and the anode airbridge during handling.

The 25 fF capacitance of the MA4AGP907 is useable for mmwave switch and switched phase shifter applications. This diode is designed for use in pulsed or CW applications, where single digit nS switching speed is required. For surface mount assembly, the low capacitance of the MA4AGP907 makes it ideal for use in microwave multithrow switch assemblies, where the series capacitance of each “off” port adversely loads the input and affects VSWR.

Package Outline

(Top View Shown Is With Diode Junction Up)



Absolute Maximum Ratings @ 25 °C[1]

Parameter	Maximum Rating
Operating Temperature	-65 °C to +125 °C
Storage Temperature	-65 °C to +150 °C
JunctionTemperature	+175 °C
Dissipated RF & DC Power	50 mW
RF C.W. Incident Power	+ 23 dBm C. W.
Mounting Temperature	+300 °C for 10 sec.

1. Operation of this device above any one of these parameters may cause permanent damage.

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Electrical Specifications and RF Data @ T_A = 25 °C

Parameters and Test Conditions	Symbol	Units	1 MHz & DC Specifications			1 GHz Reference Data[1,2]		
			Min.	Typ.	Max.	Min.	Typ.	Max.
Total Capacitance at -10 V	Ct	pF	-	0.027	0.035	-	-	-
Forward Resistance at +10 mA	Rs	Ω	-	-	-	-	3.1	-
Forward Voltage at +10 mA	Vf	Volts	-	1.35	1.45	-	-	-
Reverse Leak Current @ -45 V	Ir	uA	-	-	I -10 I	-	-	-
Switching Speed (10 to 90% RF Voltage)[3] & (90 to 10% RF Voltage)[3]	Trise Tfall	nS	-	2	-	-	-	-

NOTES:

1. Forward Series Resistance is determined by measuring Single Series Diode with a HP4291 Impedance Analyzer at 1 GHz.
2. Reverse current will not exceed 10 microamperes at the Maximum Voltage Rating.
3. Switching speed is measured between 10% and 90% or 90% to 10 % RFVoltage for a Single Series Mounted Diode. Driver Delay is Not included.

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Device Installation Procedures

The following guidelines should be observed to avoid damaging GaAs Flip-Chips.

Cleanliness

These chips should be handled in a clean environment. Do not attempt to clean die after installation.

Static Sensitivity

Aluminum Gallium Arsenide PIN diodes are ESD sensitive and can be damaged by static electricity. Proper ESD techniques should be used when handling these devices. These devices are rated Class 0, (0-199V) per HBM MIL-STD-883, method 3015.7 [C = 100pF ±10%, R = 1.5kW ±1%]. Even though tested die pass 50V ESD, they must be handled in a static-free environment.

General Handling

These devices have a polymer layer which provides scratch protection for the junction area and the anode air bridge. Die can be handled with plastic tweezers or picked and placed automatically with a #27 tip vacuum pencil.

Assembly Requirements Using Electrically Conductive Ag Epoxy and Solder

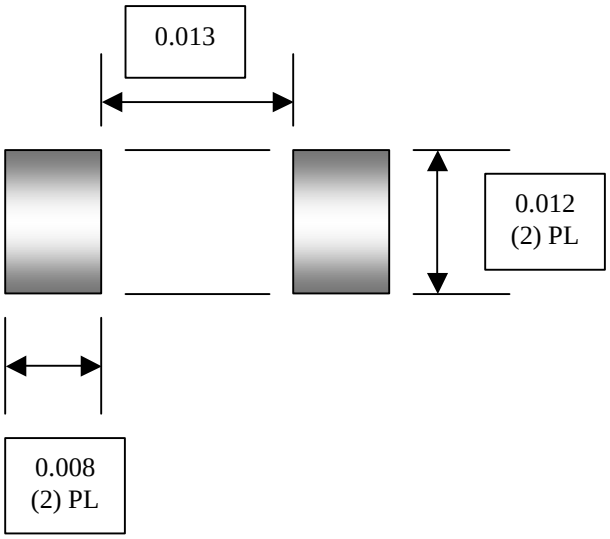
These chips are designed to be inserted onto hard or soft substrates with the junction side down. They should be mounted onto silk-screened circuits using Electrically Conductive Ag Epoxy, approximately 1-2 mils in thickness and cured at approximately 90°C to 150 °C per manufacturer's schedule . For extended cure times > 30 minutes, temperatures must be below 200 °C.

Sn Rich Solders (> 30 % Sn by weight) are not recommended due to the Tungsten Metallization scheme beneath the gold contacts. Indalloy type or 80 Au/20 Sn Solders are acceptable. Maximum soldering temperature must be < 300 °C for < 10 sec.

Ordering Information

Part Number	Package
MA4AGP907	Die in Carrier
MA4AGP907-T	Tape in Reel
MA4AGP907-W	Wafer on Frame

Circuit Mounting Dimensions (Inches)

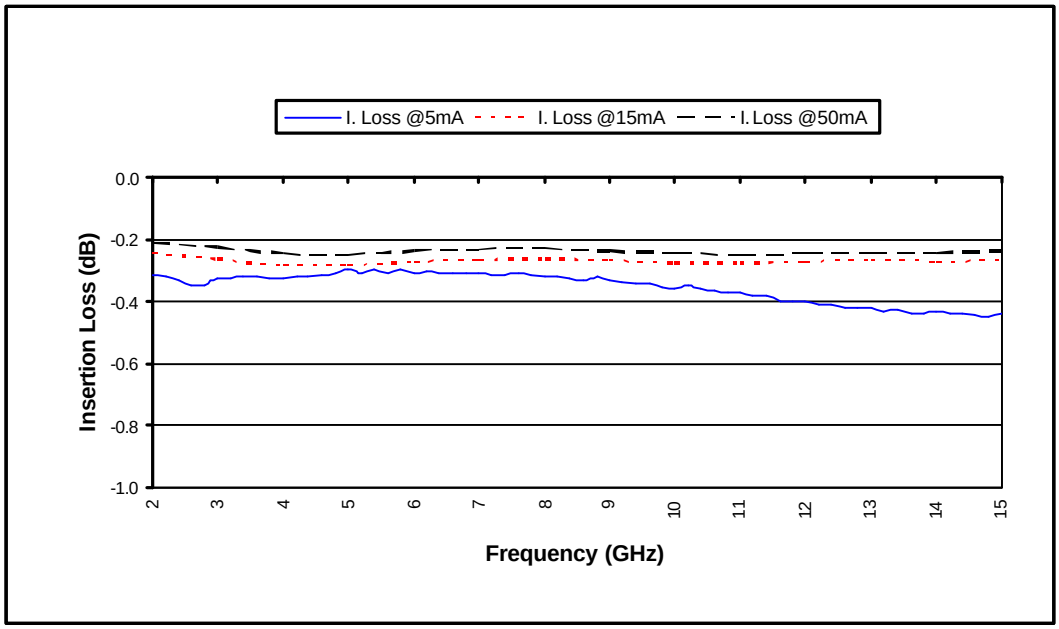


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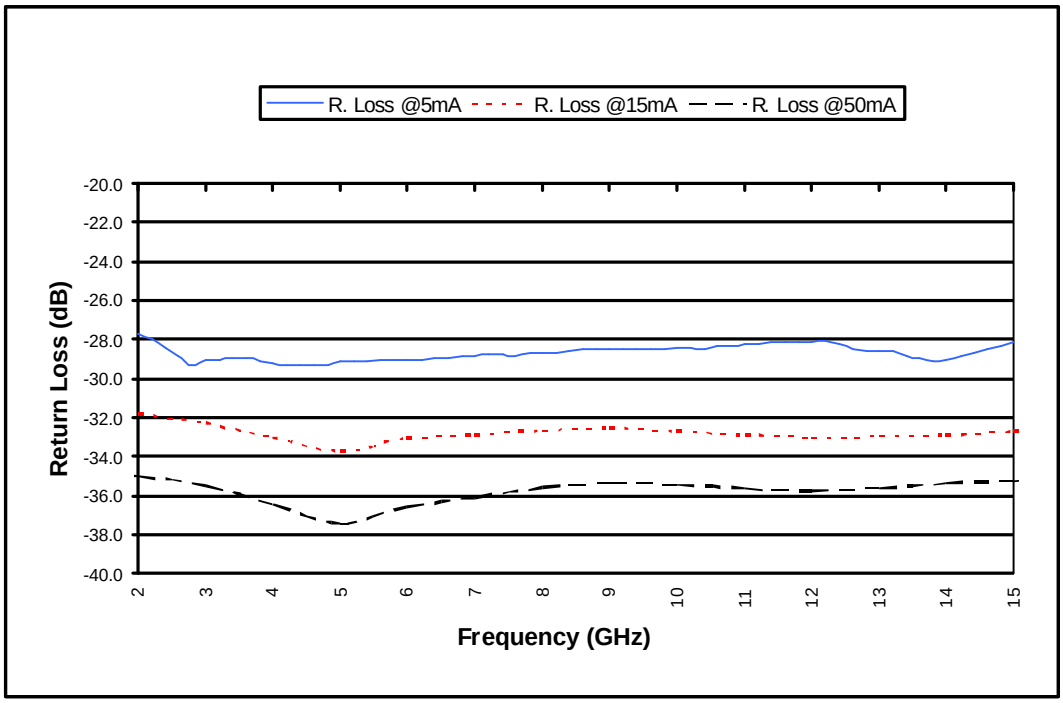
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Single Series Diode Insertion Loss vs Frequency



Single Series Diode Return Loss vs Frequency

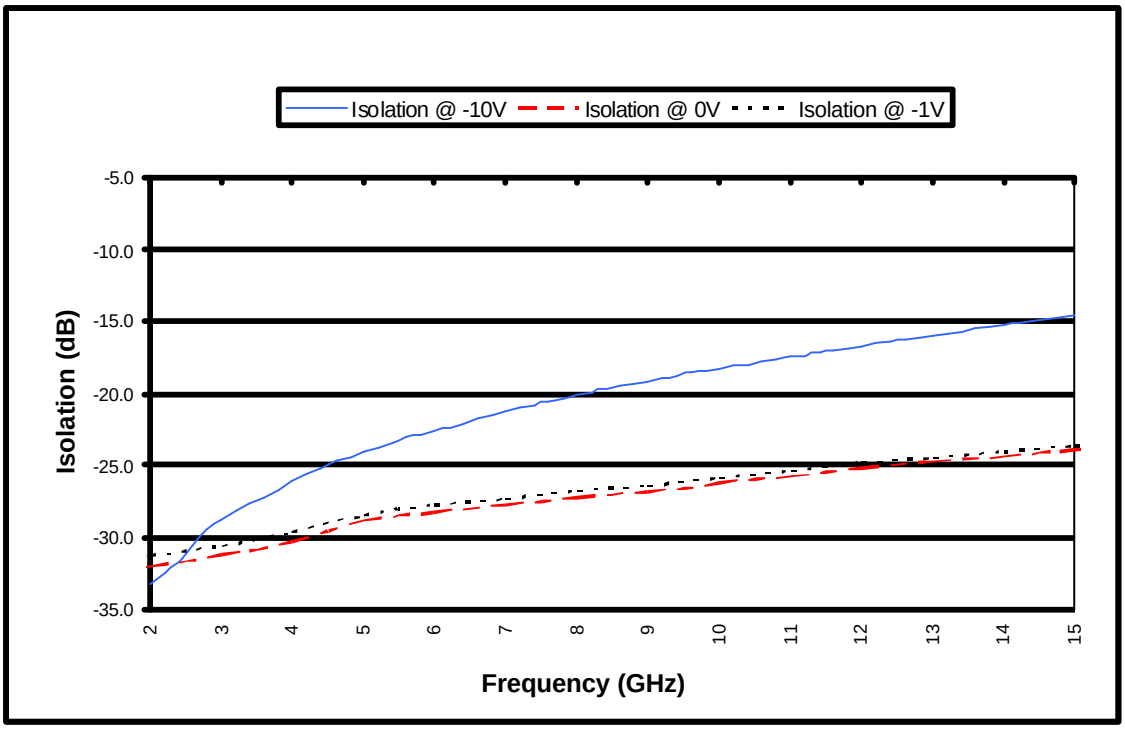


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Single Series Diode Isolation vs Frequency



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